Ephemeris for Physical Observations of the Moon. By A. Marth.

1889, January 1 to April 1.

Greenwich Noon.		Selenographical Colong. of the Sun.	Lat. of the Sun.	Geocentric Libration. Long. of the Earth.	Lat. of the Earth.	Amount.	Direction.
1889.							
Jan.	1	262°68	+0°28	+2·06	−1°80	2°73	228°7
	2	274·87	0·26	3·72	−0·05	3·77	269·2
	3	287·06	0·23	5·11	+1·68	5·38	288·2
	4	299·25	0·20	6·14	3·26	6·95	298·0
	5	311·43	0·18	6·76	4·60	8·17	304·3
	6	323·61	+0·15	+6·96	+5·64	8·95	309·2
	7	335·78	0·13	6·76	6·36	9·28	313·5
	8	347·94	0·10	6·21	6·75	9·16	317·6
	9	0·10	0·07	5·34	6·82	8·65	322·1
	10	12·25	0·04	4·27	6·58	7·84	327·2
	11	24·40	+0·01	3·02	6·06	6·62	333·6
	12	36·54	−0·02	1·69	5·29	5·55	342·3
	13	48·68	−0·05	+0·34	+4·29	4·30	355·4
	14	60·82	0·08	−0·97	3·10	3·25	17·4
	15	72·95	0·12	2·20	1·77	2·82	51·2
	16	85·08	0·15	3·29	+0·34	3·31	84·1
	17	97·21	0·18	4·22	−1·12	4·37	104·9
	18	109·34	0·21	4·95	2·56	5·56	117·2
	19	121·47	0·24	5·46	3·88	6·70	125·5
	20	133·60	−0·28	−5·74	−5·04	7·63	131·4
	21	145·74	0·31	5·78	5·95	8·29	136·0
	22	157·88	0·34	5·58	6·55	8·59	139·8
	23	170·03	0·37	5·12	6·81	8·52	143·2
	24	182·19	0·39	4·42	6·67	8·00	146·6
	25	194·35	0·42	3·50	6·14	7·07	150·4
	26	206·52	0·44	2·39	5·23	5·75	155·5
	27	218·70	−0·47	−1·13	−3·97	4·13	164·1
	28	230·78	0·49	+0·23	2·48	2·49	185·3
	29	243·07	0·52	1·61	−0·77	1·78	244·4
	30	255·26	0·54	2·91	+0·96	3·07	288·2
	31	267·46	0·56	4·06	2·59	4·82	302·6
Feb.	1	279·66	0·58	4·97	4·05	6·41	309·2
	2	291·85	0·61	5·58	5·23	7·63	313·2
	3	304·04	−0·63	+5·83	+6·09	8·42	316·4

Greenwich Noon.	Selenographical Colong. of the Sun.	Selenographical Lat. of the Sun.	Geocentric Libration. Long. of the Earth.	Geocentric Libration. Lat. of the Earth.	Geocentric Libration. Amount.	Geocentric Libration. Direction.
1889.	°	°	°	°	°	°
Feb. 4	316·22	−0·65	+5·71	+6·60	8·72	319·3
5	328·40	0·68	5·23	6·77	8·55	322·5
6	340·58	0·70	4·43	6·62	7·97	326·3
7	352·75	0·73	3·38	6·18	7·04	331·4
8	4·92	0·76	2.15	5·47	5·88	338·6
9	17·08	0·78	+0·81	4·54	4·61	349·9
10	29·23	−0·81	−0·55	+3·41	3·45	9·1
11	41·38	0·84	1·85	2·13	2·82	40·9
12	53·52	0·86	3·01	+0·74	3·10	76·2
13	65·66	0·89	3·97	−0·71	4·03	100·1
14	77·80	0·92	4·68	2·14	5·15	114·6
15	89·94	0·94	5·11	3·50	6·19	124·5
16	102·07	0·97	5·24	4·71	7·04	132·0
17	114·21	−0·99	−5·09	−5·68	7·62	138·3
18	126·35	1·02	4·69	6·36	7·89	143·7
19	138·50	1·04	4·08	6·67	7·82	148·7
20	150·65	1·06	3·32	6·61	7·39	153·4
21	162·81	1·08	2·45	6·15	6·62	158·3
22	174·97	1·10	1·53	5·31	5·53	164·0
23	187·14	1·12	−0·57	4·16	4·20	172·1
24	199·32	−1·13	+0·38	−2·74	2·77	188·0
25	211·50	1·15	1·33	−1·16	1·76	228·8
26	223·69	1·17	2·23	+0·48	2·28	282·2
27	235·89	1·18	3·07	2·09	3·71	304·3
28	248·09	1·19	3·80	3·56	5·20	313·1
Mar. 1	260 29	1·21	4·37	4·79	6·48	317·7
2	272·50	1·22	4·73	5·73	7·43	320·6
3	284·71	−1·24	+4·82	+6·35	7·96	322·9
4	296·91	1·25	4·62	6·62	8·06	325·2
5	309·11	1·27	3·91	6·55	7·63	329·3
6	321·31	1·28	3·31	6·18	7·01	331·9
7	333·50	1·30	2·26	5·53	5·98	337·9
8	345·69	1·32	+1·02	4·66	4·77	347·7
9	357·87	1·33	−0·33	3·58	3·60	5·2
10	10·05	−1·35	−1·70	+2·36	2·91	35·8
11	22·22	1·36	3·01	+1·02	3·18	71·2
12	34·38	1·38	4·15	−0·37	4·16	95·1
13	46·54	1·39	5·04	1·78	5·34	109·5

Greenwich Noon.	Selenographica Colong. of the Sun.	Lat	Geocentric Libration. Long. of the Earth.	Lat.	Amount.	Direction.
1889.	°	°	°	°	°	°
Mar. 14	58·70	−1·41	−5·61	−3·13	6·42	119·2
15	70·86	1·42	5·81	4·36	7·26	127 0
16	83·01	1·44	5·63	5·38	7·78	133·8
17	95·16	−1·45	−5·08	−6·12	7·95	140·5
18	107·31	1·46	4·22	6·52	7·76	147·2
19	119·46	1·47	3·14	6·52	7·23	154·4
20	131·62	1·48	1·93	6·11	6·41	162·5
21	143·78	1·48	−0·71	5·32	5·36	172·4
22	155·95	1·49	+0·46	4·19	4·21	186·3
23	168·12	1·49	1·47	2·81	3·17	207·7
24	180·30	−1·50	+2·36	−1·27	2·68	241·8
25	192·49	1·50	3·10	+0·33	3·12	276·1
26	204·69	1·50	3·69	1·90	4·15	297·2
27	216·90	1·51	4·15	3·33	5·32	308·8
28	229·11	1·51	4·46	4·56	6·38	315·7
29	241·32	1·51	4·63	5·53	7·21	320·2
30	253·54	1·51	4·62	6·18	7·71	323·3
31	265·76	−1·51	+4·42	+6·50	7·85	326·0
April 1	277·98	1·52	3·98	6·49	7·61	328·6

The ephemeris is a continuation of that on p. 291 of the last volume.

Ephemerides of the Satellites of Saturn, 1888–89. By A. Marth. (Concluded.)

Approximate Differences of Right Ascension and Declination between the three Outer Satellites and the Centre of Saturn.

Greenwich Noon.	*Titan.* α_6-A	δ_6-D	*Hyperion.* α_7-A	δ_7-D	*Iapetus.* α_8-A	δ_8-D
1889.	s	"	s	"	s	"
Jan. 1	− 0·61	+46·7	+13·53	+43·2	+36·51	− 8·6
2	− 6·01	+34 2	+10·17	+53·7	37·95	7·2
3	−10·48	+16·2	+ 5·52	+57·4	+39·17	− 5·7
4	−13·35	− 4·4	+ 0·16	+54·1	40·16	4·1
5	−14·25	−24·5	− 5·24	+44·4	+40·91	− 2·5
6	−13·08	−41·2	−10·10	+30·0	41·41	− 0·8